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CERTIFICATION

This is to certify that Corporate Translations, Inc. has performed a true translation for FMC Corporation of the Latvian patent to an invention No. LV 11585 B, titled "An apparatus for production of alimentary granular caviar," Inventors: N. Plotnikovs, L. Fedosejeva and N. Didur, Patent Publication Date: February 20, 1997; 14 pages (CTi Job#: FC56364-65). This document was prepared by translators who are bilingual in Latvian and English and Russian and English.

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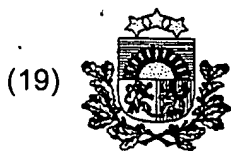
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Summary

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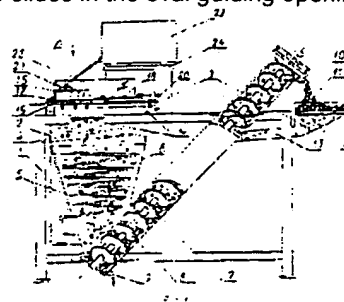
(54) Title: An apparatus for production of alimentary granular caviar

(57) Abstract: The apparatus pertains to the food industry, and may be used in making alimentary granular caviar from natural products, and specifically, for production of imitation red granular caviar. The apparatus comprises a container 2 for forming fluid (vegetable oil) 3 mounted on a frame 1, with heating elements 4 installed in the upper part of said container; a cooling coil positioned in the lower trapezoidal part of said container allowing for the formation of an annular gap to move settling granules 6 in said forming fluid.

A pipe 7 is attached at an angle to the container 2, and said pipe is a continuation of said container for forming fluid and a vessel communicating with it. A screw conveyor 8 with a drive is installed in the pipe 7. The lower part of the pipe is equipped with a valve 9 for draining of processed oil, and its upper part is equipped with a chute 10 for discharging the granules of artificial red caviar. A sieve 11 with a draining container 12 is placed under said chute in such a manner that said draining container is at the level of said container for forming fluid and connected via a pipe 13 with the chamber of said screw conveyor, thus forming the second pair of communicating vessels in which said forming fluid — vegetable oil — is at the same level.

A removable container 15 for initial forming mixture is mounted above the container 2 on four supports 14, and the bottom of said removable container is comprised of two plates with a plurality of holes, with the upper plate 16 rigidly

connected to the flange 17 of the rim of said removable container 15, for example, with bolts 18, and the lower plate 19 mounted on said upper plate in such a manner that reciprocal sliding along its surface is possible by means of a threaded handwheel 20. The holes having diameter 2.5 – 3.5 mm in one of said plates are arranged in staggered fashion relative to the holes in the other plate (in the initial position). Said container 15 for initial forming mixture is equipped with an element restricting the mass of the feeding mixture, for example, with a float 21 installed at a height h (depending upon the area of the plate and the preset diameter of the granules) that via a lever 22 is connected to the feeding container 23 having a heating device 24 and a draining valve. Said lower plate slides in the oval guiding opening.



WE CLAIM

1. An apparatus for production of alimentary granular caviar comprising a feeding container, a container for initial forming mixture, a device for granule formation, a container for forming fluid — vegetable oil — the upper part of which is equipped with heating elements and the lower part is equipped with a cooling element, and a device for granule removal, **distinguished by the features that** in order to simplify said apparatus and to make the process less labor-intensive while ensuring the stability of granule formation, said device for granule formation is comprised of two plates with holes having diameter 2.5 – 3.0 mm arranged in staggered fashion relative to the holes in the other plate, with the upper plate rigidly connected to the rim of the container for initial forming mixture, and the lower plate mounted on said upper plate in such a manner that reciprocal sliding along its surface is possible in increments of 2.25 – 3.25 mm, a device for granule movement is attached at an angle to the lower part of the container for forming fluid as a screw conveyor with a draining valve at the bottom and a chute for moving the granules at the top, and in addition, the apparatus is equipped with a separating sieve with a draining container that is installed under the chute of the screw conveyor at the level of the container for forming fluid and connected via a pipe with the chamber of the screw conveyor, and said container for initial forming mixture is equipped with an element restricting the volume of the feeding mixture.
2. An apparatus according to Claim 1 **distinguished by the features that** the element restricting the feeding mixture is, for example, a float that via a lever is connected to a valve of a distribution container.

System for production of alimentary caviar

This invention pertains to the food industry and may be used for production of alimentary caviar from natural products, and specifically, for production of imitation red caviar.

Systems for production of caviar products are known (A.C. [Authorship Certificate] S[U] No. 1483690, International Classification A 23L 1/328, 1986; A.C. S[U] No. 1604335, International Classification A 23 L1/328, 1988), which, as a rule, consist of a container with a heated sleeve for the capsule material and a container for the filler, separately, a capsule head (one or two) and pipelines to feed the transport oil and oil for pulsation, a supply of capsule material and filler for feed of the coolant fluid.

The shortcomings of these systems are their complexity and energy-intensiveness.

The known methods of granulating caviar products by passing the protein filler through a three-channel head, coloring the oil and gelatin-former separately from each other at a constant air pressure on the surface of the components in service tanks (A.C. SU No. 1703041, A 23 L1/328, 1989) by extruding the mass that forms with an injector (*"Ratsionalizator i izobretatel"* [The Innovator and Inventor], No. 7, 1972, pp. 36-38), by creating a pulse pressure (Patent RU No. 2025991, A 23 L1/328, 1995) are material- and labor-intensive and require heavy expenditures for labor protection and safety equipment.

A system for forming spherical granules from food substances (A.C. SU No. 1732507, Int. Class. A 23 P 1/02, A 23L 1/328, 1989), which consists of a sealed supply container with a thermostat-controlled sleeve connected to a source of compressed air and provided with the capability for rotation by the nozzle in its lower element with at least two discharge holes for granules, a vessel for the forming liquid with a receiving funnel and cooling sleeve located along its axis with the formation of a circular space and a storage container with a pipeline for removal of the granules that communicates with the vessel is closest in terms of purpose and the totality of essential attributes.

Among the reasons that prevent achievement of the required technical result with use of the system, which has been accepted as a prototype, is the fact that the productivity of this installation is limited by the finite number of discharge holes (two holes of 0.3 mm, each). In addition, the complexity of the system is brought about by the presence of a large number of cooling sleeves, air-tight thermostat-controlled containers, a pressure source (for forming the granules and for their removal from the storage receptacle), equipment for metering and spraying drops of the original solution as well as transport lines.

The problem of assembling the optimum system for production of food-grade caviar from natural products that will ensure an increase in productivity while retaining stability of granulation and simplification of design with a reduction in energy costs was established by the authors.

The noted technical result is achieved with realization of the invention by the fact that, in the prior art for production of alimentary caviar consisting of a service container, a container for the original forming mixture, a system for forming granules, a container for the forming liquid - vegetable oil, equipped in its upper portion with a heating element and a cooling element in the lower part, a system for removal of the granules, a system for forming granules made of two plates with holes of 2.5-3.0 mm placed in

a checkerboard pattern in relation to the holes in the second plate, the uppermost of which is connected to the rim of the container for the original forming mixture while the lower plate is mounted on the upper plate with the ability for reciprocal sliding along its flat surface with a spacing of 2.25-3.25 mm, the system for discharge of the granules is made as a screw augur with a dump valve at the bottom and a chute for discharge of the granules at the top mounted at an angle to the lower part of the container for the forming liquid; additionally, the system is also equipped with a separator screen with an overflow container mounted under the chute for the screw augur at the level of the upper part of the container for the forming liquid and is connected by a pipeline to the augur cavity while the container for the original forming mixture is equipped with a device to limit the volume of mixture being fed such as a float, for example, which is connected by a lever to the service container valve.

It was confirmed by experiment that the use of two perforated (with a large number of holes) plates for formation of granules mounted with the ability to adjust the discharge holes within limits of 0.2-0.3 by opening the holes with a shift in the plates relative to each other given a design spacing for their feed of 2.25-3.25 mm and maintaining a constant batch of the mixture being fed will ensure an increase in productivity and retention of granulation stability. In addition, making the system for removal of the granules as an inclined augur that moves the granules upwards onto a screen with an overflow container placed at the same level with the upper part of the container for the forming liquid will simplify design significantly, making it compact and convenient for use with a reduction in energy costs, i.e., support solution of the problem established by the authors.

Defining the prototype as the closest analog has made it possible to find the totality of attributes in the system in the application that are essential in relation to the technical result outlined in the claims of the invention. Consequently, the invention in the application meets the "novelty" criterion.

Additional research was conducted to verify that the invention in the application satisfies the requirements for the level of an invention. As a result, a system was found

for preparing imitation black caviar from food products (patent RU No. 2029479, A 23L 1/328, 1995) that incorporates a vessel divided into two parts: an upper –heated – container for forming granules and a lower –cooled– container for separation of granules from the oil where both containers are equipped with electrical control activators in the form of paddles mounted at the center of the working medium of each container with the ability to rotate, and transport valves while the lower container has a valve for release of oil mounted at the separator level of the “forming liquid-water” vessel; here, the container for the original forming mixture is made as an open funnel with one or several discharge channels with a diameter of 3-5 mm, a communicating funnel with the forming container that is also divided into several sections separated from each other, one of which is used for refilling the forming liquid. In addition, the system is equipped with a separate screen with an overflow container while the funnel is equipped with an insert filter made as a screen.

Among the reasons preventing achievement of the required technical result during use of the prior art is the fact that, in the prior art, feed of the original solution occurs in the process of granule formation in the forming solution present during rotary movement through one or several holes with a diameter of 3-5 mm with formation of a diameter of 2-2.5 mm in the granules that are formed which does not ensure stability of granulation for red caviar whose diameter must be 3-4 mm.

Search results have shown that, for the specialist, the invention in the application does not follow a clear model from the prior art since the effect of transformations described by this invention that are characterized by indications distinct from the prototype on achieving the technological result has not been shown. Consequently, the design in the application corresponds to the “level of invention” requirement in terms of current legislation.

A fundamental diagram of the proposed invention is shown in Figure 1 while figure 2 depicts the container for the original forming mixture – view through arrow A and Figure 3 shows the same thing, section B-B.(starting position).

The system for production of food-grade caviar includes a container 2 for the forming liquid 3 in the upper part of which heater elements are mounted with a spiral tube 5 that has the ability to form a circular space for movement of the precipitating granules 6 into the forming liquid affixed to the frame 1. In the bottom part of the container 2, the tube 7 in which the screw auger 8 is mounted with a control (not shown), which appears as an extension of the container for the forming liquid and which communicates with the vessel above it is cut in at an angle. The tube 7 is equipped in its lower part with a valve 9 for dumping waste vegetable oil and a chute 10 for off-loading the finished product – granules of artificial red caviar in its upper part. A screen 11 with an overflow container 12 is placed under the chute such that the overflow container is set at the level of the upper part of the container for the forming liquid and connected to the cavity of the auger by a line 13 forming a second pair of communicating vessels in which the forming liquid – vegetable oil – remains at the same level.

The container 15 for the original forming mixture, whose bottom is made from two plates with numerous holes, the uppermost of which 16 is rigidly connected to the flange 17 of the rim of the container 15, with bolts 18, for example, while the lower plate 19 is mounted on the upper plate with the ability for reciprocal sliding about the flat surface in guides 25 by means of the flywheel 20 with threading is mounted detachably above the container 2 on four stands 14.

Here, holes with a diameter of 2.5-3.0 mm in one plate are placed in a checkerboard pattern in relation to the other plate (in the starting position). The container 15 for the original forming mixture is equipped with a device to limit the volume of the mixture being fed, a float 21, for example, which is connected by the lever 22 to the overflow valve of the service container 23 with the heating system 24.

Formation of granules is accomplished as follows.

Forming liquid – 50 liters of vegetable oil, for example, is poured into the container 2 (with container 15 removed) to a level covering a part of the overflow container 12 (as communicating vessels, container 2, the cavity of the auger 8 and overflow container 12 are permanently situated in the area of the working medium). They include the *tens*

[tubular electrical heater] and the cooling system, which maintains the temperature for heating the upper layer of oil to 25-30°C and cooling the bottom layer to 0-7°C. The container 15 is then mounted after connecting the float 21 to the overflow valve of the service container 23. The float is mounted at level h (for example, $h = 10-15$ mm) if the area of the perforated plates is 300 x 300 mm and the assigned diameter of the resulting granules of caviar is 3-4 mm. The greater the thickness of the batch of forming mixture supplied (i.e., the greater the pressure), the smaller the output channels must be. The augur is switched on. Then, using the flywheel 20, the lower plate 19 is set to 2.75 mm opening the output channels to 0.25 mm. Droplets formed over the entire area of the plate drop into the warmed oil of the container 2, pass gradually through the zone of oil cooled to 0-7°C and drop into the augur, which removes them forcefully from the work zone up to the chute. Taking on the shape of regular spheres and after congealing to the necessary degree, the granules are removed upwards from the working medium after having spent some amount of time in the oil which does not allow them to stick together and ultimately makes it possible to ensure the form and quality of the finished product. As they drop onto the screen 4, the granules are separated from the oil. Used oil returns to the augur cavity via the pipe-line 13. After 15-20 minutes, caviar separated from the oil is packed in transparent boxes made of a polymer material with capacities up to 20 cm³.

In terms of its organoleptic and physicochemical indicators, this red caviar corresponds to requirements that include a uniform grain surface, dense grains that are separated from one another and dimensions maintained within established limits.

Thus, the information presented above attests to the possibility of utilization as characterized in the claims of the invention using the equipment and procedures described above. Consequently, the invention under application corresponds to the requirement for “industrially suitable” in terms of current legislation.

The new system proposed for production of food-grade caviar made from natural products by a new method for forming the granules by gravity flow through a special screen with holes that can be adjusted from 0.2 to 0.3 mm while maintaining constant batching of the original mixture to be supplied makes it possible to change it to virtually any size (depending on the required volume of a single batch – from the minimum with manual control to high-productivity with automatic control).

The technico-economic efficacy of using the invention under application consists of significant simplification of system design and, consequently, reducing the labor intensiveness of manufacture and operation, simplifying and reducing the labor-intensity of the process of producing imitation caviar while ensuring stability of the process of granulation and also increasing productivity of the system several times over.

Claims of the invention.

1. The system for production of food-grade caviar consisting of a service container, a container for the original forming mixture, a system for forming granules, a container for the forming liquid- vegetable oil, equipped in the upper part with a heating element and a cooling element in the lower part, a system for removing the granules *is distinguished by the fact* that in order to simplify the system and reduce the labor-intensiveness of the process while ensuring the stability of granulation, the system for granule formation is made from two plates with holes of 2.5-3.0 mm set in a checkerboard pattern in relation to holes of the second plate, the uppermost of which is rigidly connected to the rim of the container for the original forming mixture while the lower plate is mounted on the upper plate with capability for reciprocally sliding along its flat surface with a spacing of 2.25 – 3.25 mm, the system for removal of the granules is made as a screw augur with an overflow valve below and a chute for removal of the granules above mounted at an angle to the lower part of the container; in addition, the system is also equipped with a separating screen with an overflow container mounted under the screw augur chute at the level of the upper part of the container for the forming liquid and connected by a pipeline to the augur cavity while the container for the original forming mixture is equipped by a device to limit the volume of the mixture being fed.

2. The system in claim 1 *is distinguished by the fact* that the device to limit the volume of the mixture being fed is made as a float connected to the valve of the service container, for example.

Abstract

System for production of
alimentary caviar.

This invention pertains to the food industry and may be used for production of food-grade caviar from natural products and, specifically, for imitation red caviar.

The system for production of food-grade red caviar consists of a container 2 for the forming liquid – vegetable oil 3, in the upper portion of which is mounted heating elements such as tubular electrical heaters 4, a spiral tube 5 in the cooling system with the ability to form a circular space for moving the precipitating granules 6 in the lower trapezoidal portion secured to a stand 1. A tube 7 in which a screw augur 8 and control (not shown in the figure), which is an extension of the container for the forming liquid and a vessel that communicates with it, is cut in at an angle in the lower part of the container 2. The tube 7 is equipped in its lower part with a valve 9 for removing used vegetable oil and in the upper portion with a chute 10 for offloading the granules of imitation caviar. A screen 11 with an overflow container 12 is placed under the chute such that the overflow container is set at the level of the upper part of the container for the forming liquid and connected by a pipeline 13 to the cavity of the augur, forming a second pair of communicating vessels in which the forming liquid – vegetable oil – is set at the same level.

A container 15 for the original forming mixture, the bottom of which is made from two plates with numerous holes, the uppermost of which 16 is rigidly connected to the flange 17 of the rim of the container 15 with bolts, for example, while the lower plate 19 is mounted on the upper plate with the capability for reciprocal sliding along its flat surface in guides using the flywheel 20 with threading is mounted detachably above the container 2.

Here, holes with a diameter of 2.5-3.0 mm in one plate are set in a checkerboard pattern in relation to holes in the other plate (in the starting position). The container 15 for the original forming mixture is equipped with a device to limit the volume of mixture being fed, a float 21, for example, which is mounted at the level h (depending on the area of the plates and assigned diameter of the resulting granules) and connected by a lever 22 with the overflow valve of the container 23 with the heating system 24.

Here, the lower plate slides in the guides of the oval holes 25. A functional diagram of the system is shown in Figure 1.

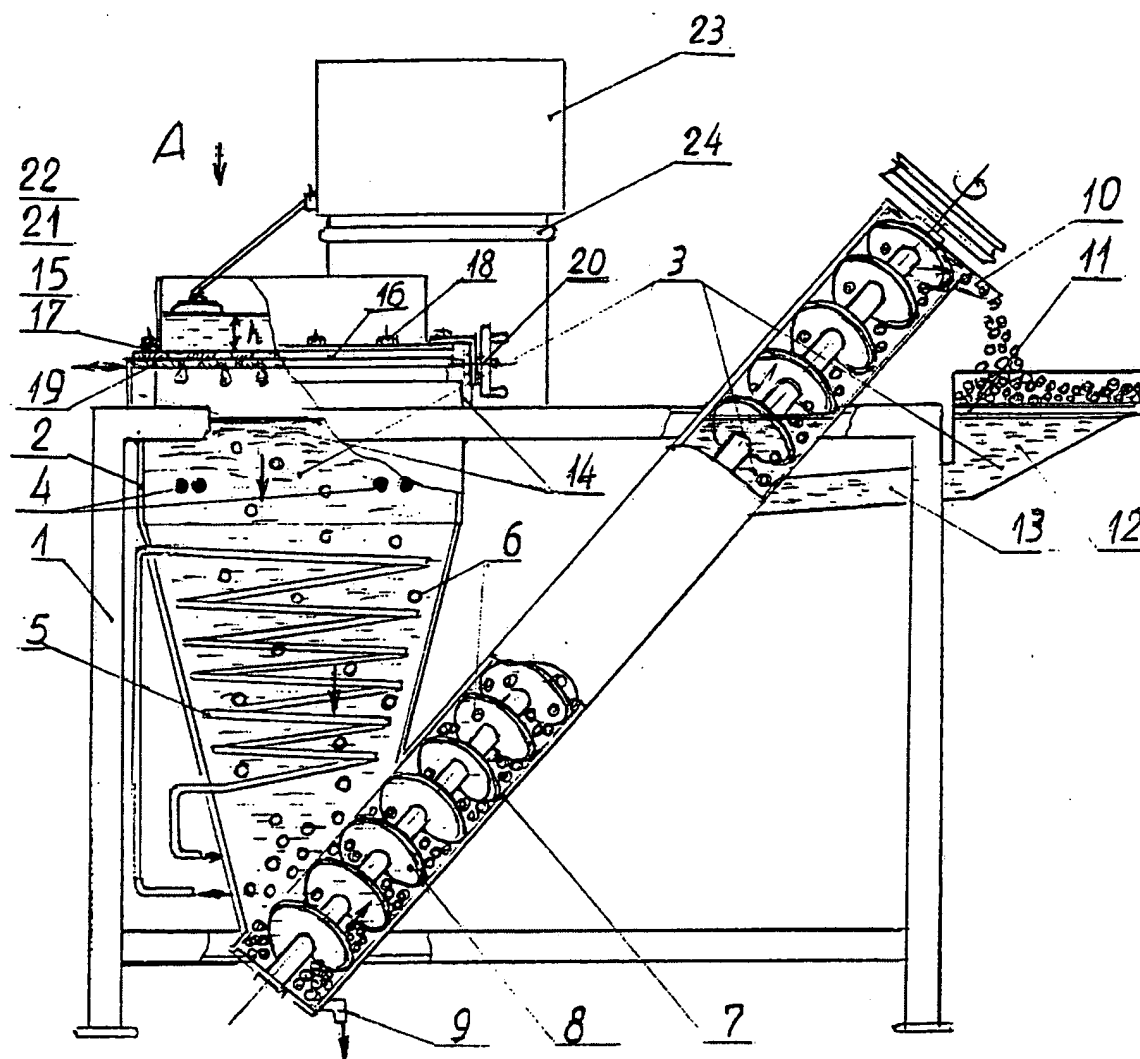


Fig. 1

Δ

2

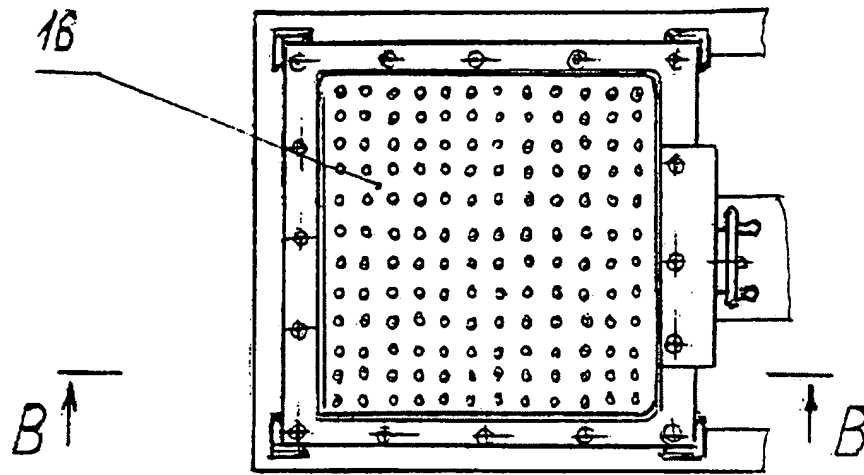


Fig. 2

B-B

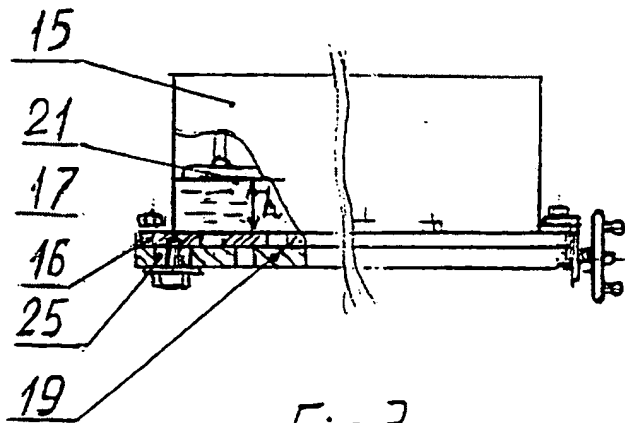


Fig. 3